Cold feet, warm heart

Heart

Image challenge

Cold feet, warm heart

Rong Bing MBBS,[1,2] Mardi Hamra MD,[2] David E Newby MD PhD[1,2]

[1] BHF Centre for Cardiovascular Science, University of Edinburgh, UK

[2] Edinburgh Heart Centre, Royal Infirmary of Edinburgh, UK

Word count: 388

Key words: myocardial infarction, angiography, myocardial injury

Disclosures: No disclosures

Address for correspondence:

Dr Rong Bing

BHF Centre for Cardiovascular Science, University of Edinburgh

47 Little France Crescent

Edinburgh EH16 4TJ

Email: rong.bing@ed.ac.uk

CASE

A 38-year-old man presented with four weeks of exertional dyspnoea and abdominal bloating, culminating in an acute episode of paroxysmal nocturnal dyspnoea. He was known to have a cardiomyopathy based on history and echocardiography but had been lost to follow-up before further investigations were completed. There was no chest pain, infective prodrome or recent travel. He smoked tobacco occasionally and drank approximately 50 units of alcohol per week. On examination, blood pressure was 110/80 and heart rate was 90. The jugular venous pressure was elevated. An S3 was heard but lungs were clear auscultation. The abdomen was soft and mildly tender. Inflammatory markers and renal function were normal and high-sensitivity troponin I was 14 ng/L. Soon after presentation, the patient described a cold left foot, with some associated pallor. The patient then developed acute right arm weakness and facial droop which spontaneously resolved within 20 minutes. Computed tomography (CT) of the brain demonstrated a hyperdense left middle cerebral artery, consistent with thrombus. Lower limb CT angiography revealed distal left anterior tibial artery occlusion. An electrocardiogram (ECG) and transthoracic echocardiogram (TTE) are shown in Figure 1 and Videos 1a-b.

What further investigation would offer the most clinical information?

a) Cardiac CT
b) Transoesophageal echocardiography
c) Contrast-enhanced TTE
d) Cardiac magnetic resonance (CMR)

DISCUSSION

Correct answer: D.

The ECG shows sinus rhythm. The echocardiogram demonstrates severe global left ventricular dysfunction without definite evidence of left ventricular thrombus, but the clinical index of suspicion is high. CMR offers excellent sensitivity for the detection of intracardiac thrombus while also providing an assessment of the myocardium - useful in this clinical context. Cardiac CT can visualise left ventricular thrombus but requires iodinated contrast, ionising radiation and is inferior to CMR for soft tissue characterization. Transoesophageal echocardiography is invasive and imaging of the left ventricular cavity can vary considerably – particularly the apex, which is far-field. Contrast-enhanced TTE is an excellent and generally accessible modality for detection of left ventricular thrombus, but beyond this does not add incremental information to the baseline TTE.

Unfractionated heparin was commenced and CMR performed (Figure 2, Video 2a-b). This demonstrated several large, mobile thrombi in the left ventricle with basal-mid septal and inferior late gadolinium enhancement in a non-infarct distribution. The patient then developed new right leg ischaemia and underwent urgent bilateral embolectomy. He recovered well and was discharged on warfarin and heart failure therapy.

This case demonstrates the importance of clinical assessment and the use of adjunctive imaging to support a clinical diagnosis. When left ventricular thrombus is suspected but not seen on two-dimensional echocardiography, contrast echocardiography or CMR should be considered (1-3).

PATIENT AND PUBLIC INVOLVEMENT

This case was published with the encouragement and written consent of the patient. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

FUNDING

This work was supported by the British Heart Foundation (CH/09/002, RE/13/3/30183, RE/18/5/34216, PG/19/40/34422 and RG/16/10/32375 to DEN) and the Wellcome Trust (WT103782AIA to DEN).

COMPETING INTERESTS

The authors declare no competing interests.

CONTRIBUTORSHIP STATEMENT

RB prepared the first draft. RB, MH and DEN reviewed and edited the final manuscript. All authors are responsible for the overall content.

FIGURE AND VIDEO LEGENDS

Figure 1 – Baseline investigations

a) Electrocardiogram

b) Transthoracic echocardiogram – 4-chamber view

c) Transthoracic echocardiogram – parasternal long-axis view

Figure 2 – Cardiac magnetic resonance

Four-chamber (a), 2-chamber (b) and 3-chamber (c) views demonstrating two large and several smaller thrombi.

Video 1 – Echocardiogram

Four-chamber (a) and 2-chamber (b) views. There is severe global left ventricular systolic dysfunction with visually preserved right ventricular contractility. There is no obvious evidence of intracardiac thrombus.

Video 2 – Cardiac magnetic resonance

Four-chamber (a) and 2-chamber (b) cines. There is again severe global left ventricular systolic dysfunction with visually normal right ventricular contractility. There are several mobile left ventricular thrombi which are clearly seen, in contrast to the echocardiogram.

REFERENCES

1. Velangi Pratik S, Choo C, Chen Ko-Hsuan A, Kazmirczak F, Nijjar Prabhjot S, Farzaneh-Far A, et al. Long-Term Embolic Outcomes After Detection of Left Ventricular Thrombus by Late Gadolinium Enhancement Cardiovascular Magnetic Resonance Imaging. Circulation: Cardiovascular Imaging. 2019;12(11):e009723.

2. Roifman I, Connelly KA, Wright GA, Wijeysundera HC. Echocardiography vs. Cardiac Magnetic Resonance Imaging for the Diagnosis of Left Ventricular Thrombus: A Systematic Review. Can J Cardiol. 2015;31(6):785-91.

3. Weinsaft JW, Kim J, Medicherla CB, Ma CL, Codella NC, Kukar N, et al. Echocardiographic Algorithm for Post-Myocardial Infarction LV Thrombus: A Gatekeeper for Thrombus Evaluation by Delayed Enhancement CMR. JACC Cardiovascular imaging. 2016;9(5):505-15.